Perception about mosquitoes and bed net use in relation to malaria among nomadic Fulani people of Adamawa State, Northeastern Nigeria.

By
Chessed, G*.,Idris, M. A[1]., Shadrach, P. A[2].,Yako, A. B[3].,Adamu, A.Y[4].andShitta, K. B[5]
Department of Zoology, Federal University of Technology, P. M. B. 2076, Yola, Adamawa State-Nigeria.
[1]Biology Department, College of Education Zing, Taraba State-Nigeria.
[2]Department of Science, Federal College of Education, Yola, Adamawa State- Nigeria.
[3]Department of Biological Sciences, Nassarawa State University, Keffi, Nassarawa-Nigeria.
[4]The Good Shepherd Department, LCCN Headquarters, Numan, Adamawa State-Nigeria.
[5]Department of Biological Sciences, Federal University Lokoja, P. M. B. 1154, Lokoja, Kogi State-Nigeria.

*Author for Correspondance, Email:godlychessed@yahoo.com

Abstract: Perception about mosquitoes and bed net use in relation to malaria in under-five children among nomadic Fulani of northeastern Nigeria was carried out. Three hundred (300) households with under-five children, presumed sick with malaria were sampled. Focus group discussions, in-depth interviews, as well as pre-tested structured questionnaires were used in face-to-face interviews to elicit information on health-seeking behavior from mothers of the under-five children. From the study, 32 (10.7%) respondents linked malaria to mosquitoes. Ideas about the causes of malaria did not differ significantly between ethnic group ($P > 0.05$).Majority of respondents believed malaria occur in the rainy season, while 51 (17%) felt it can be experienced in the dry season. Respondents differ also on the frequencies of malaria. While 137 (45.7%) said malaria can occur twice a year, 106 (35.3%) said it can occur once a year. Only 66 (22%) of respondents said all categories of people can have malaria. Sixteen (5.3%) respondents said keeping mosquitoes away could prevent malaria, while others cited non biomedical source. 76 (25.3%) of respondents owned nets and 22 (7.3%) gave preference to children as those in the family who should sleep under nets. As to effectiveness of nets in preventing malaria, 11 (3.7%) perceived nets can stop one from having malaria. Due to the low perception on the seriousness of malaria among the study population group, the need for health education messages that targets biomedical causes of malaria and introduction of insecticide treated nets is necessary.

Key words: Malaria, Nomadic Fulani, Nets, Practices

Introduction

Malaria is a public health problem in more than 90 countries, inhabited by 40% of the world's population (Okelo-Ogojo, 2013). About 90% of all malaria deaths in the world today occur in Africa, south of the Sahara (Karunamoorthi and Kumera, 2010;. WHO, 2002). An estimated one million people in Africa die from malaria each year and most of these are children under five years old (Okeke and Okafor, 2008).

Most people survive malaria after an illness of 10-20 days and mortality due to malaria is estimated to be over 1 million deaths each year. The vast majority of deaths occur among poor children in Africa, especially in remote rural areas with poor access to health services (WHO, 2008). Pregnant women are also at high risk; there is a fourfold increase in risk of disease and a twofold increase in death rates. Pregnant mothers who have malaria and are HIV-positive are more likely to transmit the virus to their unborn child (WHO, 2008).

Despite efforts to combat malaria, the disease has continued to be one of the main killers in Nigeria. Malaria has continued to present a considerable risk to most household and is often stated as one of the top ten health problems. Malaria is endemic in Nigeria and is the leading cause of mortality and morbidity among the population, especially among children under five years of age. Providing effective treatment is no longer enough because malaria parasites are becoming increasingly resistant to drugs. Consequently, the Ministry of Health has adopted plans to prevent malaria (FMOH, 2005). Insecticide treated nets have emerged in recent years as a promising tool and results from multi-center randomized, controlled field trials suggest that child mortality is reduced by at least 20% if children sleep under nets regularly treated with insecticides (WHO, 1998). However, to design a malaria intervention initiative, it is necessary to establish how much people knew about malaria, how severe the malaria situation was, what attitudes people had towards malaria and what practices were currently used by households against mosquitoes and malaria. This is what formed the basis of this study. The objectives of the study was to ascertain knowledge regarding malaria, investigate attitudes and practices in the prevention of malaria and mosquito bites and examine attitudes towards nets and treatment for malaria.

Materials and Methods

Study Area

The study area constitutes a major route for the yearly movement of the nomadic Fulani and their animals. It covers an area of 4,396 sq. km, and is situated between Longitude 10° 24'and 12° 45' East and on Latitude 90° 39' North and 90° 11' South. The camps are of varying population sizes. Nine of the camps (Kambla, Kpongnoduma, Labbao, Borrong, Ganigaku1, Jeddo, Kadiri, Bafere and Kupta) are located around River Benue in Numan and Demsa, while the remaining 17 (Dumburi, Gargashi, Bernga, Wuroyanka, Wuromunci, Kande, Jaligel, Lababiri, Boshikiri, Lafiya, Kwapuke, Tingno, Lakan, Godigoron, Zekun, Hoki and Ruwa) are situated around water sources with the River Benue and River Gongola basins in Shelleng and Lamurde LGAs. The area lies within a river valley and is watered by River Benue and its tributaries as well as fishing ponds. Disrupting the low-lying plains, are mountain ranges and hills.

The study area lies within the dry and hot Guinea savannah, which is clearly marked by the dry and rainy seasons. The rainy season starts in April and ends in October, while the period between November and March, mark the dry season. The north easterly Trade wind blows across the area during the dry (November-March) season with its characteristic harmattan haze. Average rainfall is about 67mm with a temperature range of between 32 °C and 40 °C.
There are two notable vegetation zones within the study area, the Sub-Sudan zone and the Northern Guinea Savannah zone. The former is marked by short grasses and short tress, while the latter is thick with tall grasses and trees. Along the banks of the rivers, the Fadamas and flood plains, are tall grasses of different species interspersed with shrubs, common among them are the hard stock gamba grass, the elephant grass (*kyesuwa*) and herbs like casto.

The study population comprised all nomadic Fulani camps found within the study area at the time. The state has a total population of 2, 102, 053 (NBS, 2010).

Methodology

Study Design

The Study area was carried out in 4 LGAs. Nomadic Fulani camps in the selected study area were identified as well as their migratory periods and routes. The different tribes and clans among these camps were also identified as well as their hierarchical arrangement. The study was conducted in both dry and wet season.

Sampling

A cluster-sample survey methodology, modified from the Expanded Programme on Immunization cluster-sampling methodology (Henderson and Sundaresan, 1982) was used to identify the 300 households, in 30 clusters.

Every third hut consecutively, was chosen and the mother (care-giver) of an under five child was selected, provided she alleges that

her child was sick of malaria. If the next household didn't satisfy this criterion, the next household in line was chosen until the sample size of 300 was reached. In cases where the mother was not available at the time of the interview, the interview was rescheduled. If the mother was not present at the time of the rescheduled appointment, another household (the household nearest to the last household) was to be chosen.

Consent and Ethical Consideration

The objectives, design and importance of the study were clearly explained to all the parties involved. Permission for the study was obtained from Fulani community leaders, householders and mothers of under five children. Participation was voluntary and participants were informed of the option to withdraw at any stage of the study without any consequence. Lancets used for the study were opened in the presence of mothers and were told to feel free to examine same before use. Laboratory test result was disclosed and discussed with each mother and treatment was given by a Community Health Assistant. Laboratory work was executed by a qualified and experienced laboratory scientist. On confirmation of a positive-malaria smear result, anti-malaria drugs were provided for the treatment of the child by a Community Health Assistant (CHA) as service delivery.

Focus Group Discussion

Forty focus group discussions were conducted among men and women. Each group consisted of 8 people. The general purpose and procedures of the FGD were explained to the participants, and their consent to join was obtained. Every third person found in the camp was asked to join. The groups were stratified according to sex and age-group. The age-group and gender composition of the group helped in facilitating free discussion. (Dawson, *et al.*, 1992).

FGDs were conducted by sex and age-categories as follows:

i. Female parents
ii. Male parents
iii. Female grandparents

Discussions centered on general health problems of the population group with particular reference to community views about malaria and bed net use. (Agyepong, 1990).

Key Informant Interview

21 oral interviews were conducted with key informants: with camp head (6), nomadic primary education teachers (5), religious leaders (3), health workers (3), grannies (2), male and female), healers (1) and drug sellers (1). This was done to obtain information on recognition and classification of fever, experience with mosquitoes, bed net use and illness experience in relation to malaria in under five children among nomadic Fulani (Agyepong, 1990).

Questionnaire administration

A structured questionnaire was used in collecting numerical data on knowledge about mosquitoes and bed net use for malaria. 300 mothers of under-five children were administered the questionnaire. The questionnaire was divided into demographic characteristics, local naming of malaria-like illness, knowledge of malaria, time of illness onset and frequency of attack, perception of mosquitoes and mosquito avoidance. The questionnaire was administered after explaining to each respondent the objective of the study and the respondents' right to refuse to answer any question (Agyepong, 1990; Dawson, *et al.*, 1992).

Specimen collection

Blood collection and laboratory procedure was carried following the method of WHO (1990).

Data analysis

Data generated were pre-coded, and keyed into the computer, processed with *Epi-info* and analysed with *SPSS* software packages respectively. Proportions were compared by the analysis of variance (ANOVA), while Pearson's correlation was used to test the correlation between mothers' presumptive diagnosis and parasitological diagnosis.

Results

From the study, 32 (10.7%) respondents linked malaria to mosquitoes. Among this group of respondents, 21 (7.0%) were Kiriyen, 4 (1.3%) were Jaafun, 6 (2.0%) were Wodaa'abe and 1 (0.3%) were from the Garkawa ethnic background (Table 1).

With respect to causation, 37.7% of mothers believe that eating fresh corn (maize), eating

fresh millet (36.0%) or even inhaling pollen dust while walking through a millet farm could cause malaria. 10.7% of mothers cited mosquitoes as being responsible for the transmission of malaria, 6.7% of mothers thought eating fresh groundnuts causes malaria and traditional ideas like eating wild fruits (2.3%), inhaling smoke from roasting corn (1.7%), staying long under the sun (0.3%)persist. Belief in the supernatural force, and drinking unboiled cow's milk represent 4.7% of the 'others', linking these to the cause of malaria. Ideas about the causes of malaria did not differ significantly between ethnic group($P > 0.05$). All respondents in the focus group discussions disliked the nuisance of mosquitoes but a few did not think they caused any ill health.

Table 1: Causes of childhood malaria among nomadic Fulani in relation to ethnic background

Cause of malaria	Ethnicity (%)				
	Kiriyen	Jaafun	Wodaabe	Garkawa	Total
Eating fresh corn (maize)	61(20.3)	30(10.0)	6 (2.0)	16(5.3)	113(37.7)
Eating fresh groundnut	17(5.7)	2(0.7)	1(0.3)	0(0)	20(6.7)
Eating fresh millet (sorghum)	68(22.7)	28(9.3)	4(1.3)	6(2.3)	108(36.0)
Eating wild fruits	6(2.0)	1(0.3)	0(0)	0(0)	7(2.3)
Inhaling smoke from roasting corn	1(0.3)	0(0)	1(0.3)	3(1.0)	5(1.7)
Staying long under the sun	1(0.3)	0(0)	0(0)	0 (0)	1(0.3)
Mosquitoes	21 (7.0)	4(1.3)	6(2.0)	1(0.3)	32(10.7)
Others	7(2.3)	4(1.3)	3(1.0)	0(0)	14(4.7)
Total	182(60.7)	69(23.0)	21(7.0)	28(9.3)	300(100)

ANOVA: $P=0.186$, $F=1.717$

Table 2 Shows the seasonality of malaria. Fifty one (17.0%) of respondents said it occurred in the dry season, while 59.3% and 23.7% thought rainy season and all year round, respectively.

Table 3 show annual frequencies of malaria attacks experienced among nomadic fulani. Respondents differ on the frequency of malaria. The results indicated that 45.7% were of the opinion that one could experience malaria twice in a year, 35.3% said malaria can only be gotten once a year and 19.0% said it can be contracted more than twice a year

Table 4 show the category of people perceived to be at risk of contracting malaria among nomadic Fulani. Children were largely seen to be at great risk by 47.3% of respondents, followed by adults (30.7%) and all categories of people (22.0%).

Table 2: Seasonality of Malaria

Season	Number of respondents	Percentage
Rainy	178	59.3
All year round	71	23.7
Dry	51	17.0
Total	300	100

Table 3: Annual frequencies of malaria attacks among nomadic Fulani

Frequency ofattack	Number of respondents	Percentage
Once a year	106	35.3
Twice a year	137	45.7
Thrice a year	57	19.0
Total	300	10.0

Table 4: Perception of risk with malaria

Category	Number of respondents	Percentage
Children	142	47.3
Adults	92	30.7
All people	66	22.0
Total	300	100

Bed net ownership

Table 6 show availability (ownership) of bed net among nomadic Fulani. From the table, only 25.3% of respondents said they owned mosquito net, while 74.7% did not have a mosquito net in their dwelling place.

Table 7 show bed net usage among nomadic Fulani. Two hundred and twenty one (73.7%), said no one sleeps under a net, 7.3% said children alone should be given the privilege of sleeping under a mosquito net, 5.0% said breast feeding mothers should be allowed to sleep under a mosquito net, while 42 (14.0%) felt fathers are the ones to sleep under a mosquito net.

Table 6: Bed net ownership among nomadic Fulani

Ownership	Number of respondents	Percentage (100%)
Yes	76	25.5
No	224	74.7
Total	300	100

Table 7: Bed net usage among nomadic Fulani

Who sleeps under net	Number of respondents	Percentage (100%)
Nobody	221	73.7
Children	22	7.3
Breast feeding mother	15	5.0
Father	42	14.0
Total	300	100

Table 8 show perception on effectiveness of mosquito net among nomadic Fulani. Ninety six percent felt they were not sure of it's effectiveness in controlling malaria, while 3.7% said the mosquito net is effective in the control of malaria. Only 1 (0.3%) said it is very effective in the control of malaria.

Table 8: Perception on effectiveness of bet net among nomadic Fulani

Effectiveness (100%)	Number of Respondents	Percentage
Not sure	288	96.0
Effective	11	3.7
Very effective	1	0.3
Total	300	100

Discussion

The widely held belief that malaria (*Pabboje*) is caused by agents other than biomedical concepts still prevails as observed in this study Chesse*det al.*(2013). This is similar to the studies carried out in Tanzania and Ghana (Winch*et al.*, 1994; Gessler*et*

al., 1995; Gessler, 1995and Ahorlu, 1997). In Ghana, malaria is perceived as an environmentally related disease caused by excessive contact with external heat which upset the blood equilibrium (Agyepong, 1992). In parts of Guatemala malaria is thought to be caused by bathing too frequently or by drinking unboiled water (Ruebush*et al.*, 1992). Elsewhere in Guatemala, malaria is thought to be derived from exposure to cold or wet conditions and eating too much of the wrong foods (Klein*et al.*, 1995). These misconceptions that people hold have direct implications for both preventive and treatment-seeking behavior as well as for malaria control activities.

The bite of mosquitoes was presented as more menacing than the way they disturb ones sleep. This is suggestive of some local variation within the study population in terms of knowledge of malaria and possible exposure to health education, not in terms of health education delivered formally, but with respect to information gathered through media (radio) and one-on-one communication especially health personnel and outsiders, for example missionaries. It was obvious from interaction with health workers, that mothers might one way or the other obtained this idea.

From interviews held in a FGD, the following opinion was obtained:

'although mosquitoes (chuffi) were known to be abundant during the rainy season, there is no known link between mosquitoes and disease'

All cases of malaria-related illness, irrespective of their cause were thought to occur only during the rainy season.

Prevention of malaria

Among nomadic Fulani who own nets, these nets were used to prevent the nuisance caused by mosquitoes during sleep and their irritating bites, not in an attempt to prevent malaria-related illness. The nets were not impregnated with insecticide, as these nomads haven't heard about insecticide impregnated bed nets.

Purchasing nets requires an outlay of cash by nomads and this is a great burden among them. As such not all family members sleep under these nets, for those families that owned one. In place of net, some nomads spend money on less expensive methods, including burning various substances, which may include leaves of certain plant, tree barks and mosquito coils to repel mosquitoes. The implication here is that one has to stay awake for most part of the night to keep coils burning on fire stokes. These substance causes irritation to the system and often times gives respiratory problems. Most nets observed were in poor condition. Some of them had between 6-12 holes.

Seasonality is a major consideration in the use of nets among nomads, not only in how it affects the use of nets, but also in the perceived risk of malaria related to when the mosquito population is largest. The rainy season was identified as the time when net usage was common, during the high mosquito season. It would therefore advisable to target this period for the delivery and promotion of insecticide nets among nomads. Such promotion campaigns ought to adopt a balanced view on the useful benefit of nets for protection against malaria, and protection against nuisance of mosquitoes.

Among those who do not own nets, nomadic Fulani were of the view that owning nets is a luxury and a sign of prestige.Use of nets may fluctuate based upon perception of mosquito nuisance, which in turn may be related to seasonal variations in mosquito density (Hewitt*et al.*, 1992). Indeed, the primary concern may be with avoiding the nuisance of bites, over and above fear of malaria transmission. In this population group perceptions about risk of malaria and mosquito is not made, and the majority of nomadic Fulani's in this study do not see the link between malaria and mosquito as being more abundant during the raining season, the time when the locally recognized malaria (*pabboje*) was thought to be very common. Although this population group do not differentiate malaria-related illness based upon duration of symtomatology alone, but rather on the time of year in which the illness occurred. Febrile illness during the long dry season was more often ascribed catarrh.

Conclusion and Recommendation

The findings of this study clearly suggest that quite a sizeable proportion of respondents had misconceptions about knowledge regarding malaria and undesirable practices in the prevention of malaria. This is a major impediment in implementing effective malaria control strategies. Appropriate health education campaigns are essential to mounting a good control plan. Communication messages should be designed to promote knowledge, attitude and practices in the prevention of malaria and bed nets usage.Since complicated malaria is associated with very high mortality, health education interventions should focus on improving the nomadic Fulani mothers' perception and knowledge to recognize the link between malaria and convulsions. Health education should focus on changing the misconception and beliefs about convulsions by improving their knowledge. The importance of nonscientific and traditional theories of illness causation to malaria control should not be underestimated, since they summaries the communities' perception of the local epidemiology of malaria and their perception of risk. Based on knowledge of local realities, new ideas should be introduced in as harmonious ways as possible, allowing old perceptions to be amended and new perceptions to be adopted.

References

Agyepong, I. A. (1990). Socio-cultural and clinical factors affecting the transmission of malaria: A study among adolescent girls in rural Ghana. Final Report, *TDR/SER/ID,* Geneva: World Health Organization.

Agyepong, I. A. (1992). Malaria: Ethnomedical perceptions and practices in an Adange farming community and its implications for control. *Social Science and Medicine,* 35(2):131-137.

Ahorlu, C. K. (1997). Malaria-related beliefs and behaviour in Southern Ghana: Implications for treatment, prevention and control. *Tropical Medicine and International Health,*2:488-499.

Dawson, S., Manderson, L. and Tallo, V. L. (1992).The focus group manual.Methods for social science research in tropical diseases No. 1. Social and Economic Research (SER).UNDP/World Bank/WHO.Special Programme for Research and Training in Tropical Diseases (TDR).

FMHN (2005). Federal Ministry of Health, Nigeria.*Annual Report* 1980- 83

Gessler, M. C., Msuya, D. E., Nkunya, M. H., Mwasumbi, L. B., Schar, A., Heinrich, M. and Tanner, M. (1995). Traditional healers in Tanzania: the treatment of malaria with plant remedies. *Journal Ethnopharmacology,* 48(3): 131-44.

Gessler, M. C. (1995). Traditional healers in Tanzania:The perception of malaria its causes. *Journal of Ethnopharmacology,*48(3):119-130.

Henderson, R. H. and Sundaresan, T. (1982). Cluster sampling to assess immunization coverage: a review of experience with simplified sampling method. *Bulletin of the World Health Organization,*60(2):253-260.

Hewitt, S. E. (1996). Self protection from malaria vectors in Pakistan: an evaluation of popular existing methods and appropriate new techniques in Afghan refuge countries. *Annals of Tropical Medicine and Parasitology,*90:337-344.

Klein, R. E., Weller, S. C., Zeissing, Richards, F. O. and Ruebush, T. K. (1995). Knowledge, beliefs and practices in relation to malaria transmission and vector control in Guaetmala.*American Journal of Tropical Medicine and Hygiene,* 52:383-388.

Karunamoorthi, K. and Kmera, A. (2010). Knowledge and health seeking behavior for malaria among the local inhabitants in an endemic area of Ethiopia: implications for control. *Health,* 2 (6):575-581.

Okeke, T. A. and Okafor, H. U. (2008). Perception and treatment seeking behaviour for malaria in rural Nigeria: Implications for control. *Journal of Human Ecology,* 24(3):215-222.

Okelo-Ogojo, F. (2013). Knowledge, attitudes and practices related to

malaria and insecticide treated nets inUganda. http://ww.malaria.org/bginfo.html.Accessed: 8 December, 2013.

National Beraeu for Statistics (2010):Annual Abstracts of Statistics 2010.National Bureau of Statistics.www.nigerianstat.gov.ng/pages/download/71 Accessed:28April, 2014.

Ruebush,T. K., Weller, S. and Klein, R. E.(1992).Knowledge and beliefs about malaria on the Pacific coastal plain of Guatemala. *American Journal of Tropical Medicine and Hygiene*46(4): 451-459.

Vinch, P. J., Makemba, S. R., Lwihula, G. K. L., Lubega, P., Minjas, J. N. andShiff, C. J. (1994). Seasonal variation in the perceived risk of malaria: implications for the promotion of insecticide-impregnated bednets. *Social Science and Medicine*, 39:63-75.

WHO (1990).World Health Organization Laboratory manual for developing countries.World Health Organization, 1990.

WHO (1998).World Health Organization, *Roll Back Malaria: A global partnership*. Geneva.

WHO (2002).World Health Organization, *Strategies in traditional medicine*. Geneva. WHO.

WHO (2008).World Health Organization, World Malaria Report 2008.Global malaria programme, Geneva.